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TROX® TECHNIK

Automation and Systems Technology

LABCONTROL – TFM/TPM

User Manual
TroxMConnect Operating Software

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1. Introduction

LABCONTROL Air Management
In highly sensitive areas like laboratories and hospitals, the top priority is protection of personnel. The complex requirements of these areas are fulfilled by room air conditioning systems. The monitoring and display of system parameters are indispensable here.

TROX offers with the TFM/TPM a range of monitoring devices covering the monitoring function for fume cupboards and room pressure control in new buildings and those being renovated.

Proper aerodynamic functioning of a fume cupboard must be monitored in accordance with EN 14175 by a fume cupboard function indicator. If a malfunction occurs, visual and acoustic alarms must be emitted. The TFM-1 and TFM-2 units are required for this application.

The TFM-1 has an inbuilt pressure transmitter, with which the volume flow is monitored with the differential pressure grid.

The TFM-2 is connected to an external measuring point, e.g. a volume flow controller or a velocity sensor. The physical quantity to be monitored is specified and monitored by the connected unit.

Room pressure control is used in laboratory buildings with more extensive safety requirements. The TPM is used to monitor pressure-controlled rooms.

Manual TroxMConnect
This manual contains important information on the TroxMConnect operating software for the TFM/TPM unit types.
The TFM monitoring units for fume cupboards and the TPM monitoring units for room pressure can be configured through the MConnect software.
Installation and operation are documented in detail.

General Notes
TFM/TPM units are supplied with no configuration. Commissioning by competent commissioning personnel is necessary for proper operation.
TROX cannot guarantee proper functioning if commissioning is carried out improperly.
The specifications of the laboratory equipment manufacturers, the laboratory owner and the relevant standards and regulations must be taken into account.

Great care was taken when selecting the graphics and composing the text.
TROX assumes no responsibility or liability for a faulty configuration of the units based on incorrect or misinterpreted information in this user manual.

TROX GmbH reserves the right to modify or supplement this user manual without prior notice.

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Visit us on the Internet and stay informed about LABCONTROL system at www.trox.de.

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2. Software Installation

The requirements and steps for installation are explained in the following.

2.1 System Requirements

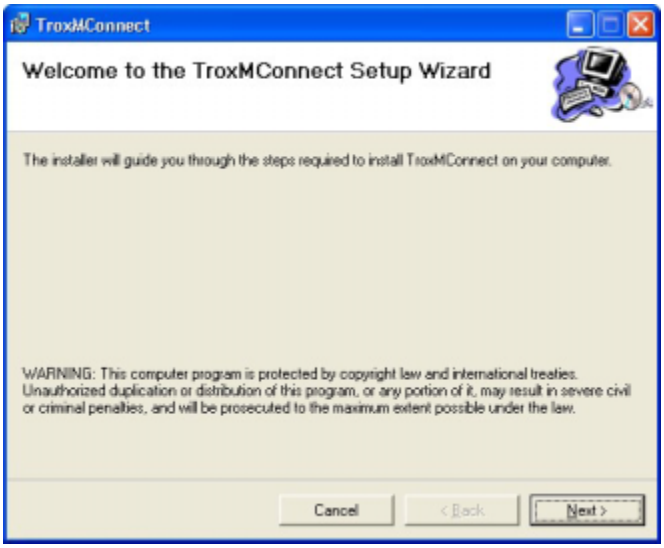
Before you install the TroxMConnect software on your PC, please review the following system requirements:

- PC — recommended: Pentium III 1 GHz or faster
- Operating system — Microsoft® Windows® 2000®; Microsoft Windows XP®
- RAM — min. 256 MB
- hard disc — min. 30 MB
- Screen — Super VGA (1024 x 768)
- Serial interface — USB to serial adapter may also be used

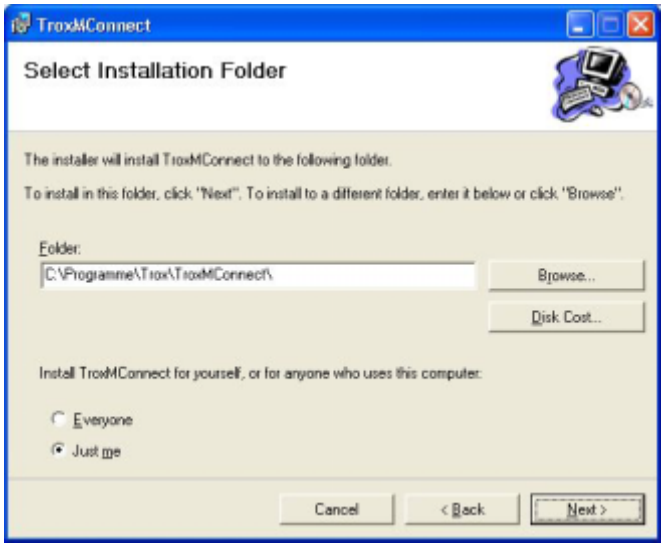
2.2 TroxMConnect Installation

To install the software, start the setup program (Setup.exe). Then follow the instructions provided. The setup program automatically installs the required data on your PC.

The following menu appears during installation:

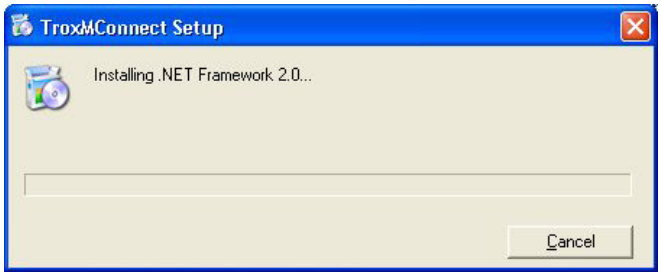

TroxMConnect
Welcome to the TroxMConnect Setup Wizard
The installer will guide you through the steps required to install TroxMConnect on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

Please click the "Next>" button after reading the warning.


TroxMConnect
Select Installation Folder
The installer will install TroxMConnect to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Programme\Trox\TroxMConnect\
Browse...
Disk Cost...
Install TroxMConnect for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

You can select whether TroxMConnect is only to be installed for the user currently logged on to the computer or if it is to be installed for all users. The installation path should not be changed.

The installation begins with another prompt after clicking "Next>". If the .NET framework 2.0 is not yet installed on your computer, it is now installed automatically. In this case, the following window appears:



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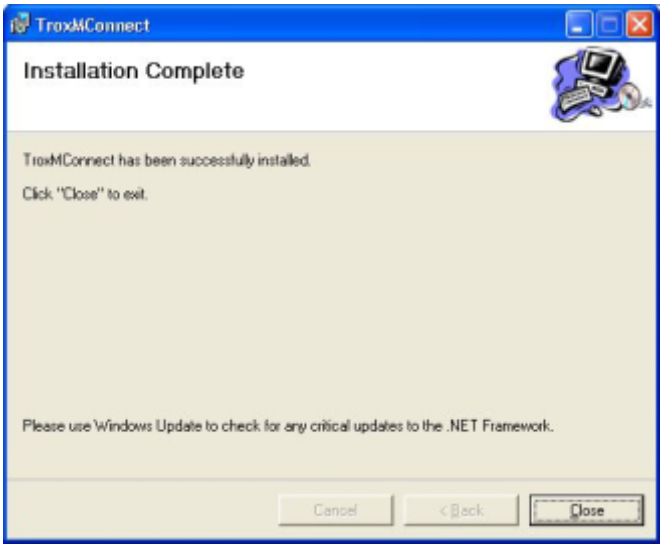
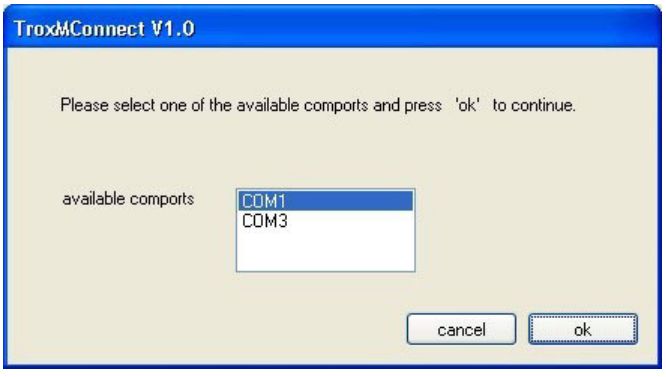
The following window appears once the installation is complete:



The TroxMConnect program can now be started via Start/Programs/TROX GmbH/TroxMConnect.

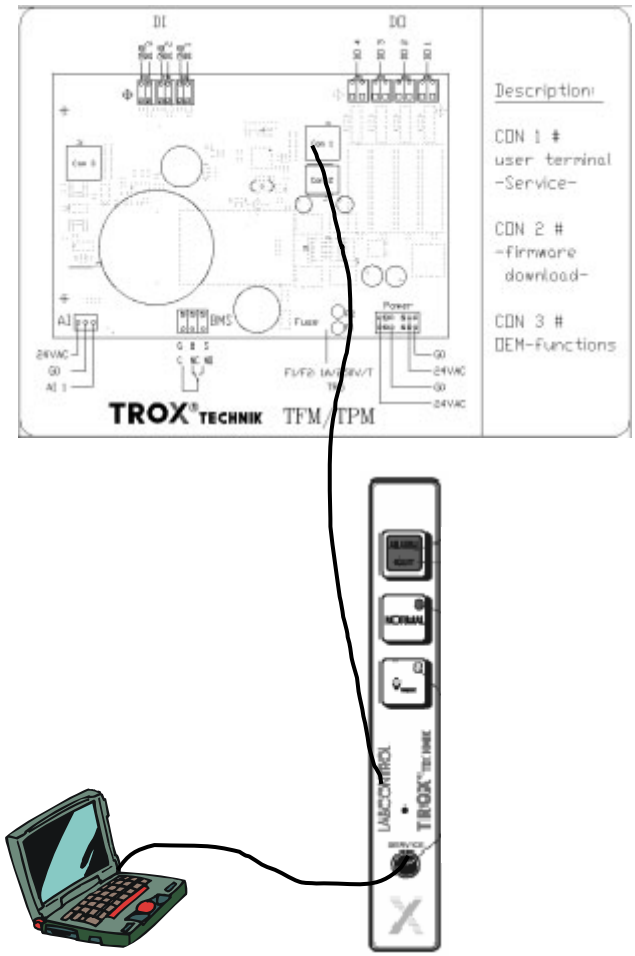
The serial interface must be selected the first time the program is started. If a USB adapter is used to provide the serial interface, this adapter must be inserted. Otherwise, a serial interface is not available on the computer.



2.3 Connection to the PC

A connection must be made between a laptop/PC and the TFM/TPM unit. For this purpose, the laptop/PC must have a serial interface.
You can connect a cable directly to the connection jack of the user terminal and thus make the connection to the monitoring unit in this way. The terminal cable for monitoring units can be ordered from TROX. The order code for the cable is M546EW5.
The cable is not included in the scope of supply of the TFM/TPM units.
The user terminal is connected to the Con1 jack on the PCB via the RJ plug.

PC - TFM/TPM connection



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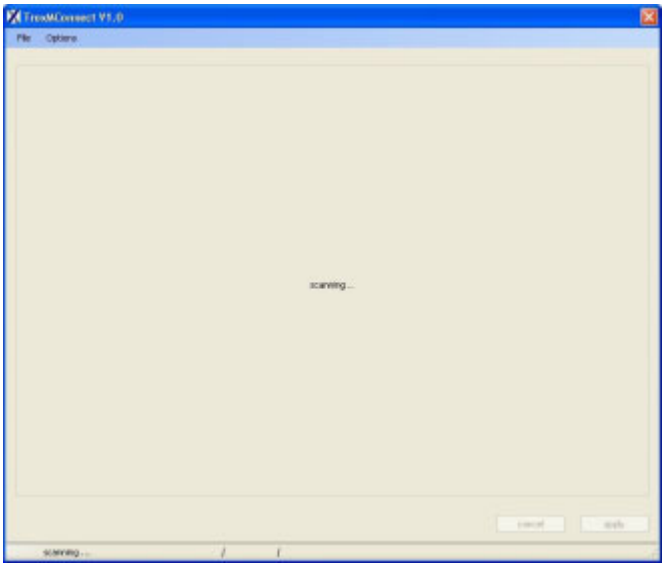
3. TroxMConnect Description

The program for monitoring fume cupboards and rooms is implemented in the TFM/TPM. If the computer is connected to a TFM/TPM and the TroxMConnect software is started, the set parameters are displayed automatically. The software has six tabs. You can find a detailed description of the individual tabs in section 3.2.1.

3.1 Starting the Software

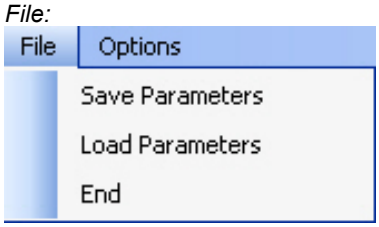
The operating software is started via the TroxMConnect icon on the desktop or via the Start menu.
If no hardware is connected, the dialog box shown below appears.



3.2 Layout

The following (see figure on page 5) is an explanation of the layout of the user interface and the functions of each area.

Field 1: Menu bar
File:



- Save Parameters

Save Parameters allows you to save an entire data record of the current configuration of the TFM/TPM. You can select any desired name to construct your own database from the various monitoring types, e.g. fume cupboards of specific sizes. The data can be saved for proof of commissioning.

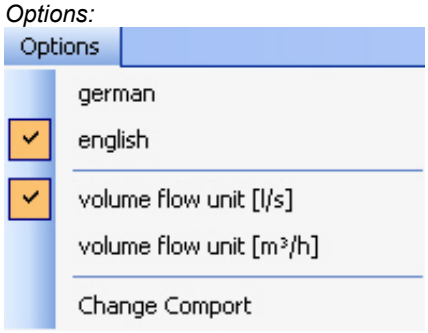
- Load Parameters

The saved data records can be loaded in the operating software via Load Parameters. Once the file has been opened, the configurations must be sent to the controller by pressing the "apply" button.

- End

Exit the software.

Options:



You can choose German or English as the language of the TroxMConnect operating software in the "Options" menu. You can choose between l/s and m³/h for the display of volume flow values. The volume flow values are saved in l/s in the TFM/TPM, so minor rounding differences may occur when displaying the values in m³/h.

- Change Comport

The communication interface can be set via Change Comport. This must occur the first time the program is started.

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Field 2: Tabs
Clicking on individual tabs opens them.

Field 3: Value Area/Configuration
The current parameters of the TFM/TPM are displayed in these areas. The configurations (e.g. actual and set values) can be read or set.
If a tab contains different function areas, they are separated from one another with a frame.

Field 4: Buttons
The cancel and apply buttons are activated when a parameter is changed.

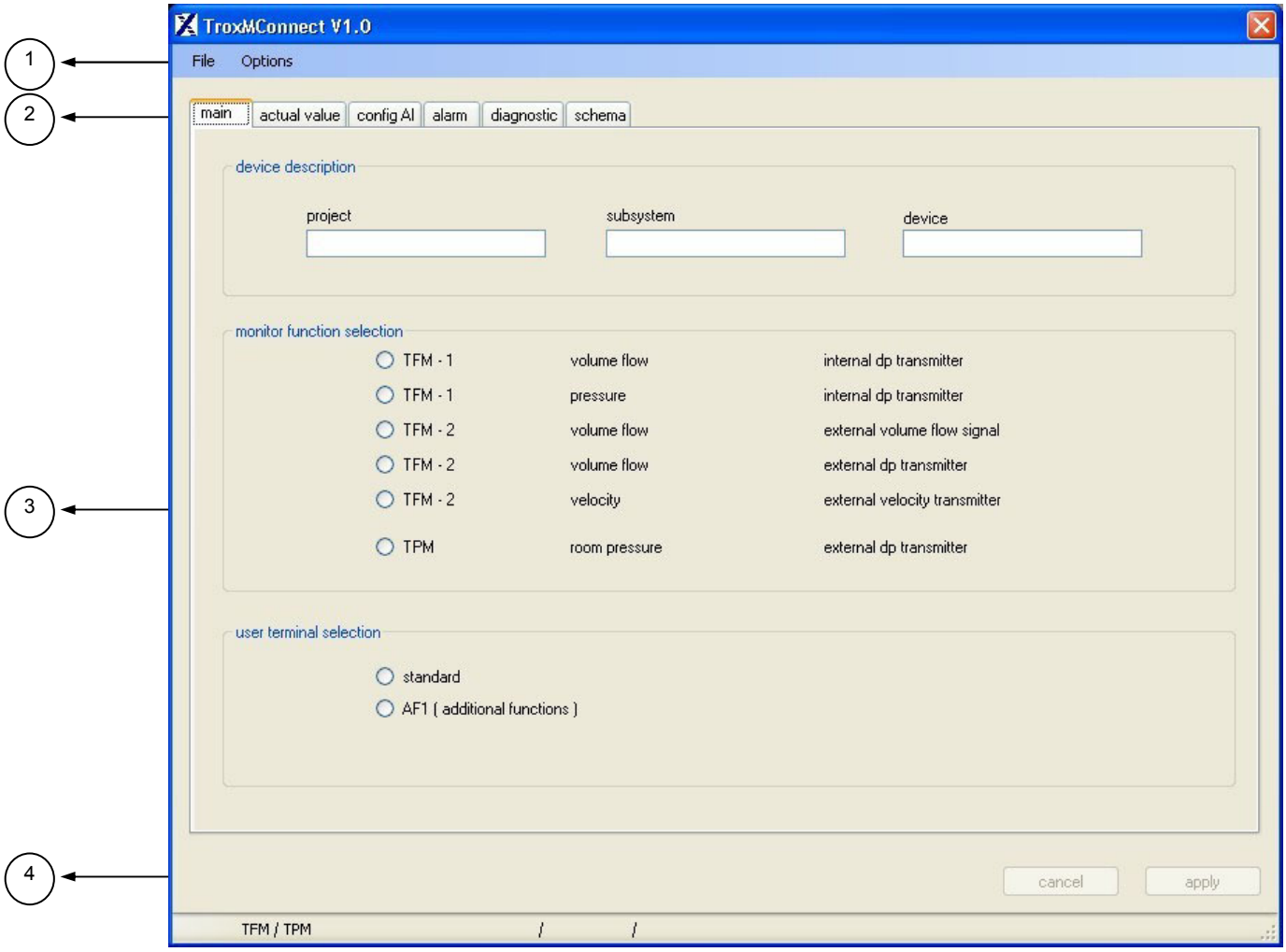
- apply

After making a change, you must click "apply" to send the change to the controller.

- cancel

If the changed parameter is not to be saved, you must cancel the procedure with "cancel".

You cannot switch between tabs until a change has been applied or cancelled.



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3.2.1 Description of Tabs

In the following sections, the individual tabs and their functions will be described in detail.

3.2.2 Tab "main"

Basic configurations for the TFM/TPM can be made on the tab "main". In the state of supply, the indicator on the user terminal flashes back and forth between red and green and it is not possible to change the tab.

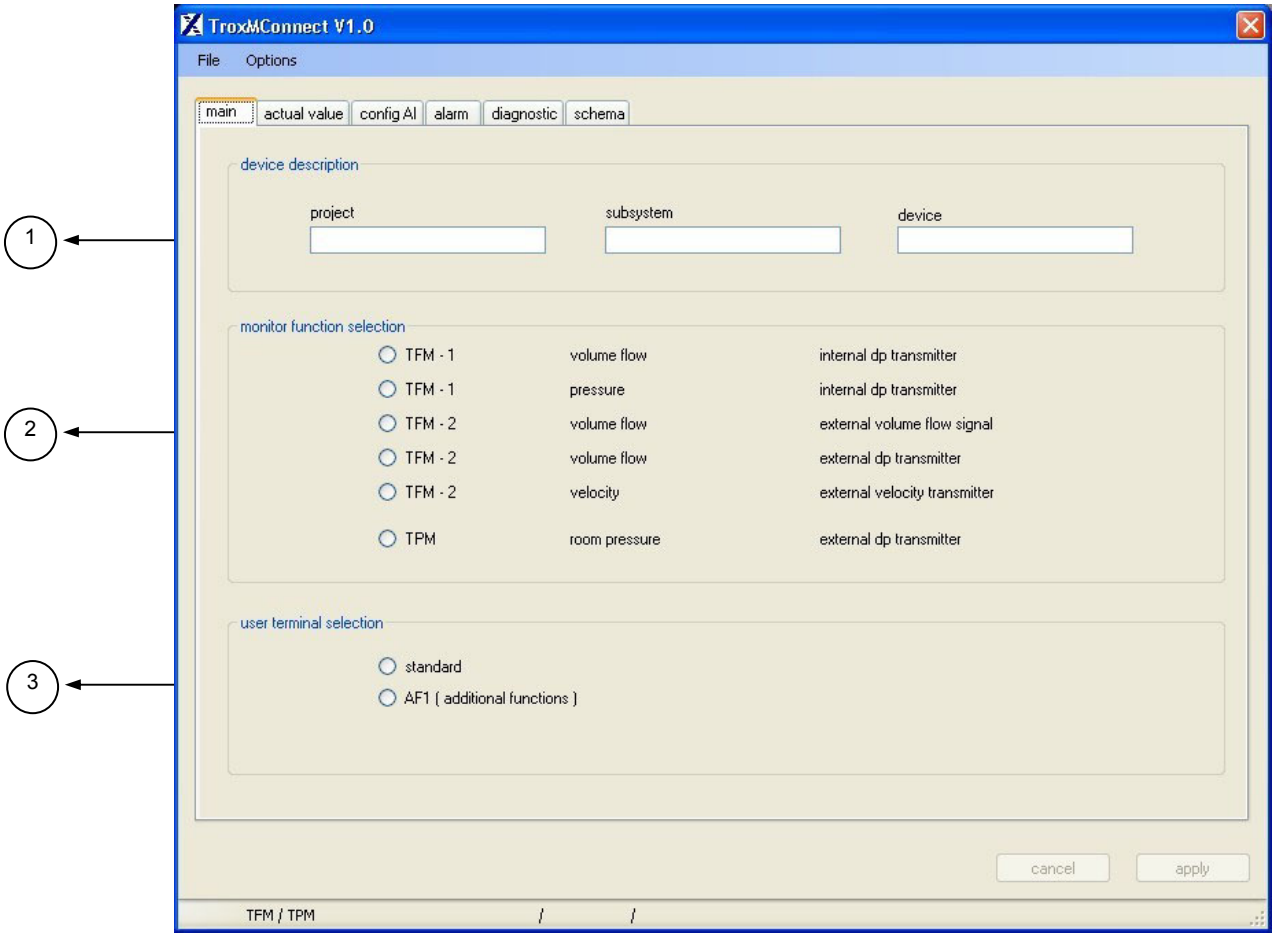
Field 1: device description
General specifications or designations for the respective monitoring unit can be entered under device description. There are three fields available for this, each with a maximum of 16 characters. The installation location can be entered here, for example.

Field 2: monitor function selection
The activated monitoring type is specified under monitor function selection. TFM-1 or TFM-2 is selected for monitoring fume cupboards, and TPM is selected for room pressure monitoring.

- TFM-1, volume flow, internal dp transmitter
Monitoring of the volume flow at the fume cupboard. Measurement of the volume flow with a measuring station, e.g. VMR. Sensors are connected directly with the 0-300 Pa internal pressure sensor. The volume flow is calculated using the formula ‡ = C x √Δp, where C = unit constant and Δp = measured differential pressure).

- TFM-1, pressure, internal dp transmitter
Monitoring of the pressure value at the differential pressure grid. The pressure value is a gauge of the volume flow at the fume cupboard.
The differential pressure grid is connected to the 0-300 Pa internal pressure sensor.

- TFM-2, volume flow, external volume flow signal
Monitoring of the volume flow at the fume cupboard. Measurement of the volume flow with volume flow controller with an actual value output, for example. The signal is wired to the analogue input.



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- TFM-2, volume flow, external dp transmitter
Monitoring of the volume flow at the fume cupboard. Measurement of the volume flow with measuring station with pressure sensor, for example. The signal is wired on the analogue input. The volume flow is calculated using the formula
‡ = C x √Δp.

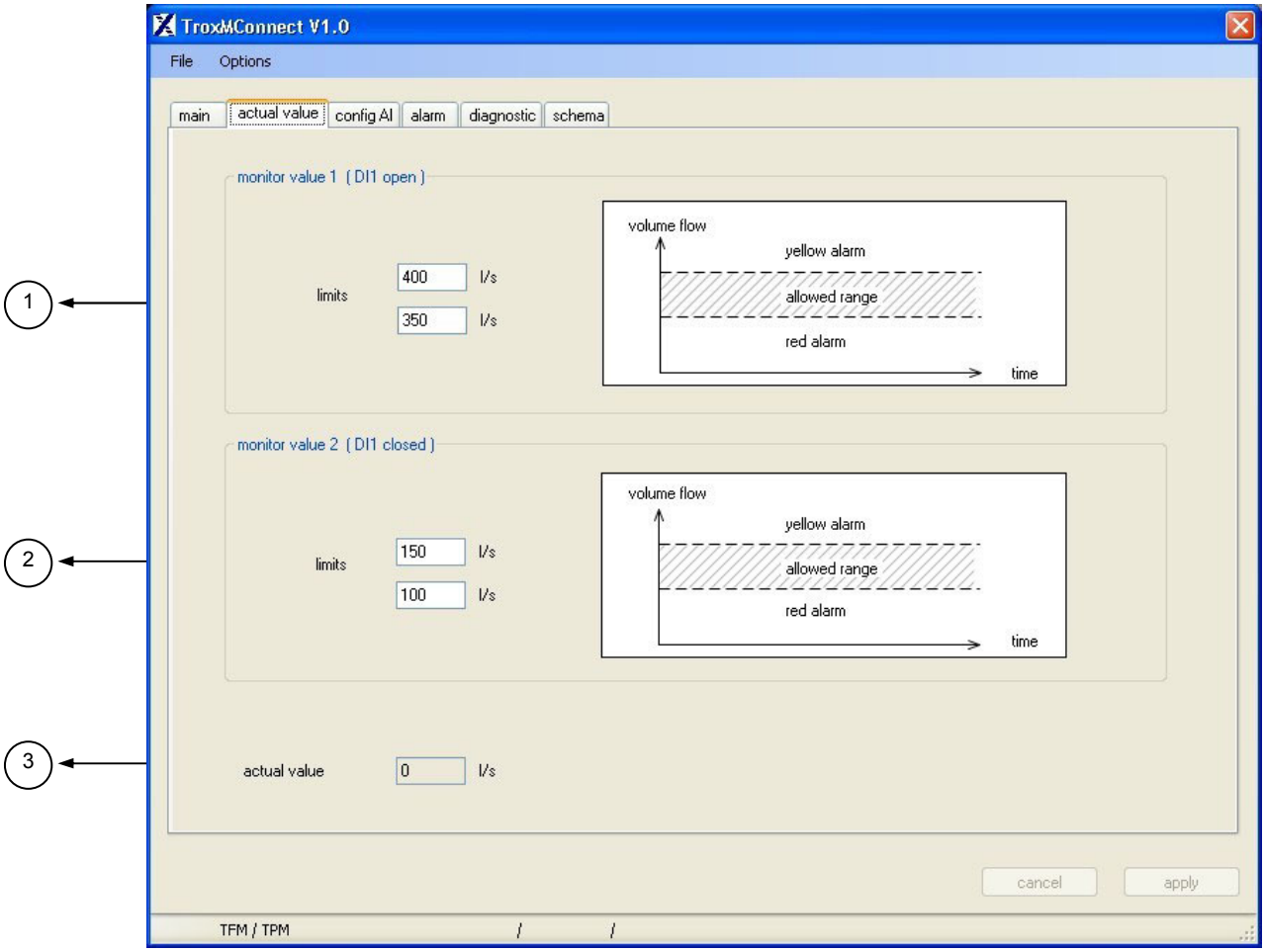
- TFM-2,velocity, external velocity transmitter
Monitoring of the entrance velocity at the fume cupboard. Measurement of the entrance velocity with velocity sensor. The velocity sensor is not included in the scope of supply. The signal is wired to the analogue input.

- TPM, room pressure, external dp transmitter
Monitoring of the pressure of pressure-controlled rooms. Measurement of the room pressure with a suitable static pressure sensor. The pressure sensor is not included in the scope of supply. The signal is wired to the analogue input.

3: User terminal selection
Various user terminals can be selected. In the scope of supply is the standardterminal included.
Standard: standard monitoring functions
AF1: additional functions: operation of sash window closer, service LED, light switch

3.2.3 Tab "actual value"

Field 1: monitor value 1 (DI 1 open)
The alarm limits for the value to be monitored are entered here. This pair of values is valid for monitor value 1, i.e. digital input 1 (DI 1) open. Upper and lower thresholds must be entered; this defines a permissible range in which an alarm is not been triggered.
The units depend on the monitoring function selection on the tab "main".



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Field 2: monitor value 2 (DI 1 closed)
The alarm limits for the value to be monitored are entered here. This pair of values is valid for monitor value 2, i.e. digital input 1 (DI 1) closed. Upper and lower thresholds must be entered; this defines a permissible range in which an alarm is not been triggered.
The units depend on the monitor function selection on the tab "main".

Field 3: actual value
The current measured value is displayed.

3.2.4 Tab "config AI"

The analogue input is configured on the tab “config AI”. The parameters are dependent on the monitor function selection and the connected sensor.

Field 1: config AI
- min/max Voltage

The analogue input is set to the output voltage range of the connected sensor or volume flow controller.

- min/max wanted signal type

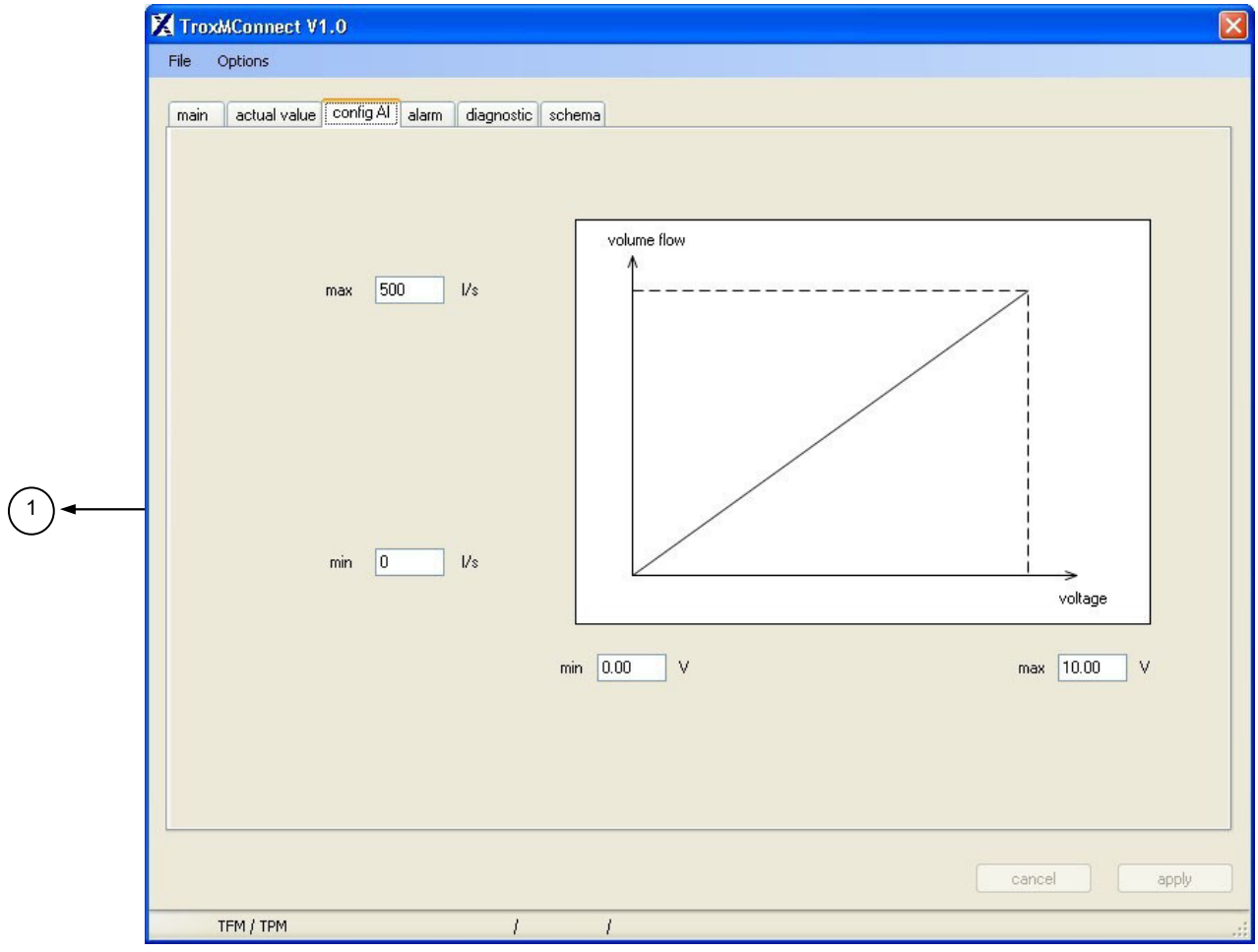
The analogue input is set to the output value range of the connected sensor or volume flow controller.

Setting values for monitor function selection
- TFM-1, volume flow, internal dp transmitter

Since the internal pressure sensor is used, only the C-value (based on l/s) needs to be entered for the conversion. The volume flow is calculated using the formula ‡ = C x √Δp. Zeroing is to be carried out at the beginning of commissioning and maintenance for purposes of zero adjustment. (see page **12**, "Zeroing")

- TFM-1, pressure, internal dp transmitter

Since the internal pressure sensor is used, no configuration of the pressure adapter is required. Zeroing is to be carried out during commissioning and maintenance for purposes of zero adjustment (see page **12**, "Zeroing").



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- TFM-2, volume flow, external volume flow signal
The voltage range and value range of the connected volume flow controller must be entered.

- TFM-2, volume flow, external dp transmitter
The voltage range and value range of the connected volume flow measuring station with pressure sensor must be entered. To convert the pressure to a volume flow, the C-value of the measuring station is entered. The volume flow is calculated using the formula
‡ = C x √Δp.

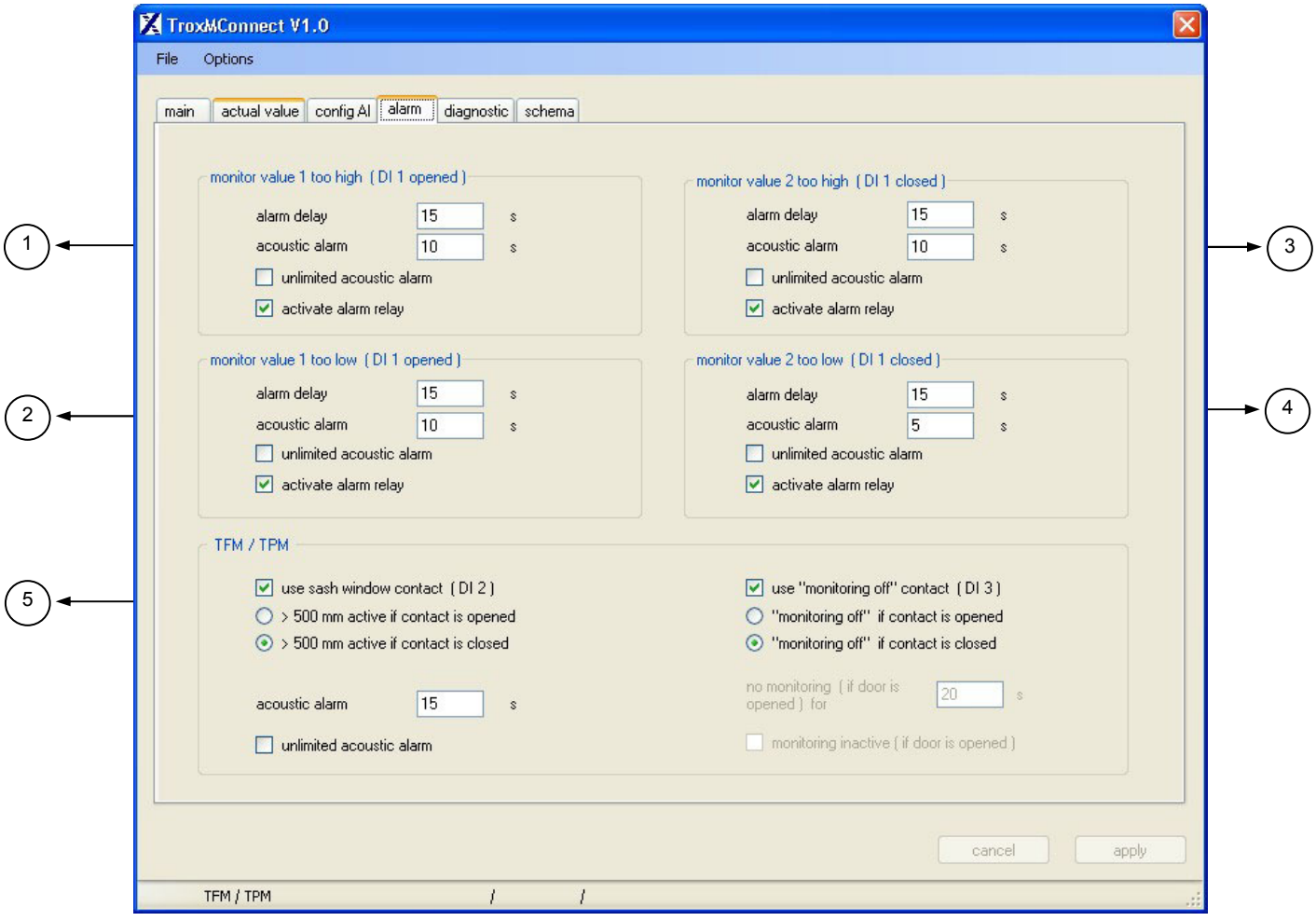
- TFM-2, velocity, external velocity transmitter
The voltage range and value range of the connected velocity sensor must be entered.

- TPM, room pressure, external dp transmitter
The voltage range and value range of the connected room pressure sensor must be entered.

3.2.5 Tab "alarm"

The way alarms are dealt with when alarm limits are exceeded or fall below a set value are defined on the tab "alarm". The alarm limits are set on the tab "actual values" (a description is found on page **7**). In case of an alarm, visual and acoustic alarms are emitted at the user terminal. The way alarms are dealt with can be specified depending on which monitor value is exceeded. The way alarms are handled is documented in the following example (monitor value 1 too high). The same rules apply for the other monitor values.

When dealing with alarms, the mathematical quantity is evaluated to decide whether the monitor value is too large or small.
Example: -40 Pa is less than -30 Pa.
This has to be made allowance for when making settings for alarm handling.


TroxMConnect V1.0
File
Options
main
actual value
config AI
alarm
diagnostic
schema
monitor value 1 too high (DI 1 opened)
alarm delay 15 s
acoustic alarm 10 s
unlimited acoustic alarm
activate alarm relay
monitor value 2 too high (DI 1 closed)
alarm delay 15 s
acoustic alarm 10 s
unlimited acoustic alarm
activate alarm relay
monitor value 1 too low (DI 1 opened)
alarm delay 15 s
acoustic alarm 10 s
unlimited acoustic alarm
activate alarm relay
monitor value 2 too low (DI 1 closed)
alarm delay 15 s
acoustic alarm 5 s
unlimited acoustic alarm
activate alarm relay
TFM / TPM
use sash window contact (DI 2)
> 500 mm active if contact is opened
> 500 mm active if contact is closed
acoustic alarm 15 s
unlimited acoustic alarm
use "monitoring off" contact (DI 3)
"monitoring off" if contact is opened
"monitoring off" if contact is closed
no monitoring (if door is opened) for 20 s
monitoring inactive (if door is opened)
cancel
apply
TFM / TPM
1
2
3
4
5

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Field 1: Monitor value 1 too high (DI 1 open)

- alarm delay

The alarm delay specifies how long the actual value must exceed the alarm limit in order to trigger an alarm. An alarm is not activated at this time.
Setting range: 0 to 3600 s

- acoustic alarm

The duration of the acoustic alarm is set in the acoustic alarm field. The acoustic alarm is cleared after the set time or by pressing the Quit button on the user terminal.
Setting range: 0 (no acoustic alarm);
3 to 3600 s

- unlimited acoustic alarm

An unlimited acoustic alarm can be selected. The acoustic alarm can only be deactivated by pressing the Quit button on the user terminal.

- activate alarm relay

If the alarm relay is activated, the alarm relay drops off during an alarm or power failure. The alarm relay is used to pass on the alarm status to higher-order equipment, e.g. building control systems.

Field 5: TFM/TPM

- use sash window contact (DI 2)

The sash window contact function pursuant to DIN EN 14175 can be activated. The contact comes from the fume cupboard and is wired to DI 2. Visual and acoustic alarms are emitted at the user terminal when the contact is actuated. The following setting options are not active until the function is selected:

Using the selection boxes
⊙ > 500 mm active if contact is opened
⊙ > 500 mm active if contact is closed
You specify whether a normally closed or normally open contact is connected as the sash window contact.

- acoustic alarm

The duration of the acoustic alarm is set in the acoustic alarm field. The acoustic alarm is cleared after the set time or by pressing the Quit button on the user terminal.
Setting range: 0 (no acoustic alarm);
3 to 3600 s

- unlimited acoustic alarm

An unlimited acoustic alarm can be selected. The acoustic alarm can only be deactivated by pressing the Quit button on the user terminal.

- use "monitoring off" contact (DI 3)

The "monitoring off" function switches the monitoring function off. To visually indicate that switching off has occurred, the red alarm indicator on the user terminal is switched on and the green operating LED on the user terminal flashes. The alarm relay remains active, because an alarm is not in effect. This can be used as a standby circuit with the TFM and as a tie-in for the door contact with the TPM. The following setting options are not active until the function is selected:

Using the selection boxes
⊙ "monitoring off" if contact is opened
⊙ "monitoring off" if contact is closed
You specify whether a normally closed or normally open contact is connected as the contact.

The following fields are only active with the TPM:

- no monitoring (if door is opened) for x s

With the TPM, you can specify the amount of time that is to pass until monitoring is switched on again. This is used to notify you in case a door has been left open too long.
Setting range: 0 to 3600 s

- monitoring inactive (if door is opened)

Monitoring is switched off as long as the door is opened (the contact is active). After the door is closed the monitoring is been activated.

Once monitoring is reactivated, the state of the system is determined and indicated visually. If an alarm is active, an acoustic alarm is emitted after the alarm delay expires.

3.2.6 Tab "diagnostic"

This tab contains status and fault messages as well as voltage signals used for diagnosing the monitoring function.

.

Field 1: Digital inputs

- DI 1 (monitorvalue contact)

Indicates the selected monitor value.

- DI 2 (sash window contact)

Indicates whether the fume cupboard sash window is open more than 500 mm.

- DI 3 (monitor contact)

Indicates whether monitoring has been switched on or off.

Field 2: Digital outputs

- DO 1 (light)

Indicates state of light relay. The light relay can be switched on and off with the light button on the user terminal.

- DO 2 (n.a.)

This digital output is not used.

- DO 3 (open sash window)

Indicates the state of the "open sash window" relay for operating the sash window closer. Function is only available with AF1 user terminal.

- DO 4 (close sash window)

Indicates the state of the "close sash window" relay for operating the sash window closer. Function is only available with AF1 user terminal.

- DO 5 (alarm)

Indicates the state of the alarm relay with changeover contact. The relay is not active (drops off) in case of an alarm.

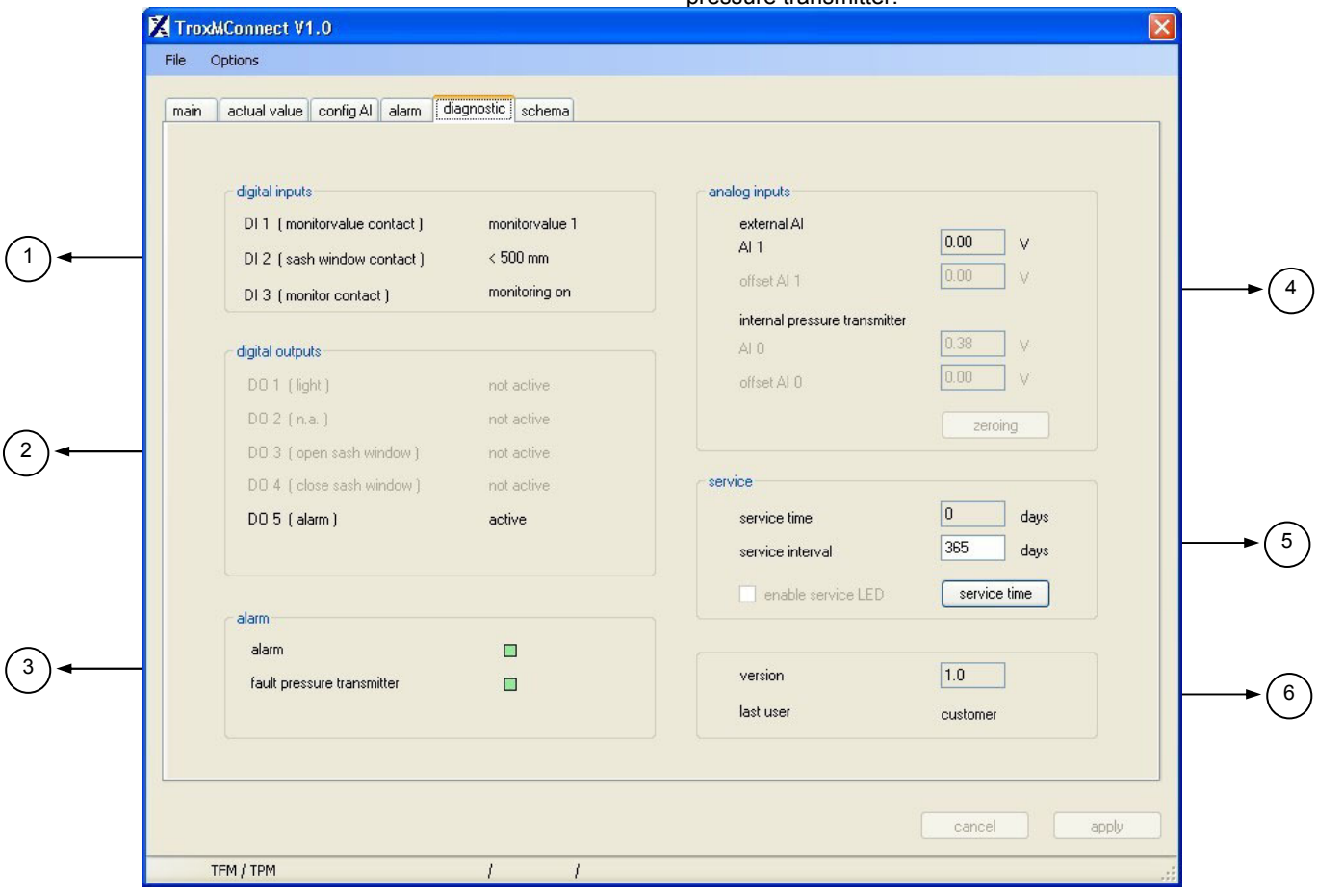
Field 3: Alarm

- alarm

Indicates the alarm state
(red or yellow field = alarm,
green field = no alarm).

- fault pressure transmitter

fault indication (red field = fault) if a fault occurs at the pressure transmitter.



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Field 4: Analogue inputs

- external AI

AI 1:
Measured voltage at analogue input 1.

offset AI 1:
Voltage measured at analogue input 1 when zeroing.

- internal pressure transducer

AI 0:
Voltage measured at the internal pressure transducer.

offset AI 0:
Voltage measured at the internal pressure transducer when zeroing.

- zeroing button

Zeroing determines the zero point of the internal or connected external pressure transducer. When executing this function, the pressure tubes must be detached from the pressure transmitter. Another window appears.
This function must be executed each time commissioning or maintenance is performed!

Field 5: Service

This function can only be used with the TFM in conjunction with the AF1 user terminal, since this user terminal has a service LED.
You can enter a service interval here (setting range: 0 to 3,600 days). Maintenance is to be performed once this interval has passed. The next maintenance date is indicated via an LED on the user terminal.

- service time button

The service time is reset to 0 with the service time button. This function must be executed each time maintenance is performed in order to start a new maintenance interval.

Field 6:

- version

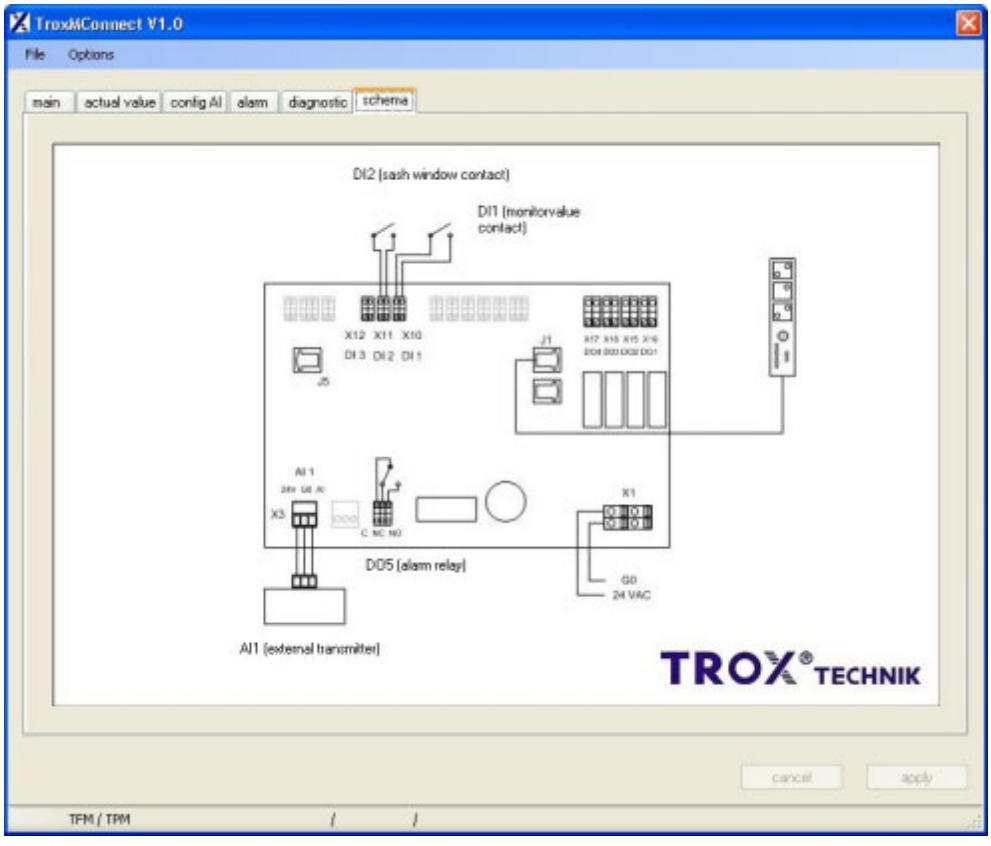
Indicates the TFM/TPM program version.

- last user

Indicates the user who made the most recent changes. Possible users: TROX and customer.

3.2.7 Tab "schema"

The wiring schematic is displayed on the tab “schema”, depending on the selected configuration.



4. Example Configurations

General Information
The TFM/TPM units are supplied with no configuration. Commissioning by competent commissioning personnel is absolutely necessary.
TROX cannot guarantee proper functioning if commissioning is carried out improperly.
The specifications of the laboratory equipment manufacturers, the laboratory owner and the relevant standards and regulations must be taken into account.

4.1 Example Configuration of TFM-1 with Measuring Grid

With the TFM-1, the volume flow is monitored at the fume cupboard with the differential pressure grid supplied. The measuring grid is mounted in accordance with the installation instructions and is connected to the 0-300 Pa internal pressure sensor. The pressure value measured during commissioning is used to determine the alarm limits.

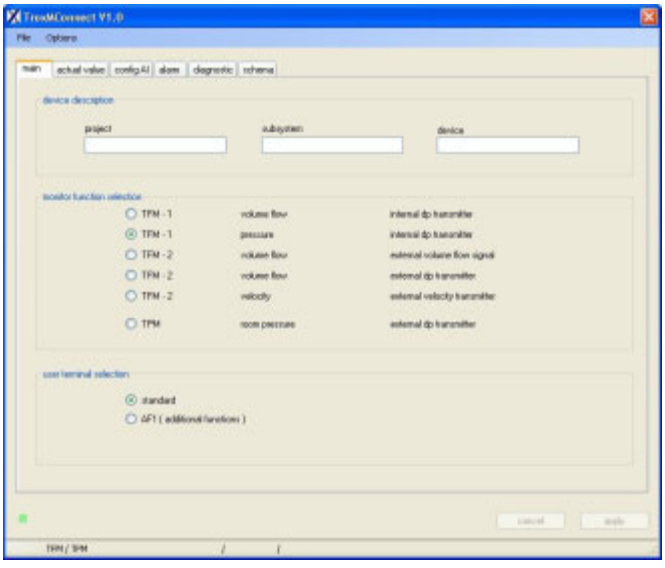
4.1.1 Function Selection

The indicator at the user terminal alternates between red and green (TFM/TPM not configured) the first time the TFM/TPM is started.

The following selection must be made on the tab “main”:

monitor function selection
- TFM-1, pressure, internal dp transmitter

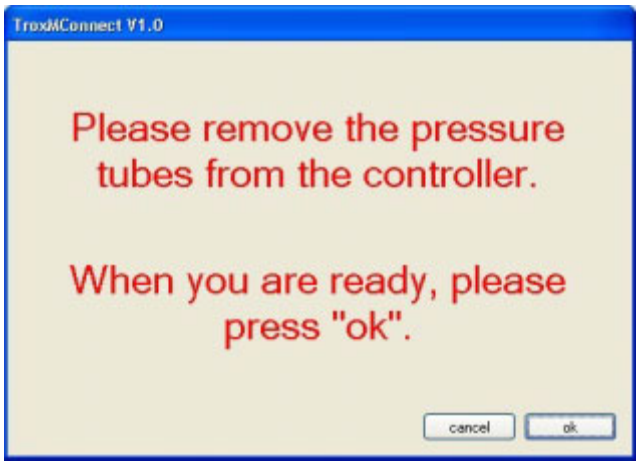
user terminal selection
- Your choice; the example uses the standard user terminal.



4.1.2 Zeroing

The TFM-1 must be zeroed before the correct measured value is displayed on the tab. This is performed by pressing the zeroing button on the tab “diagnostic” (see page **12**, "Zeroing").

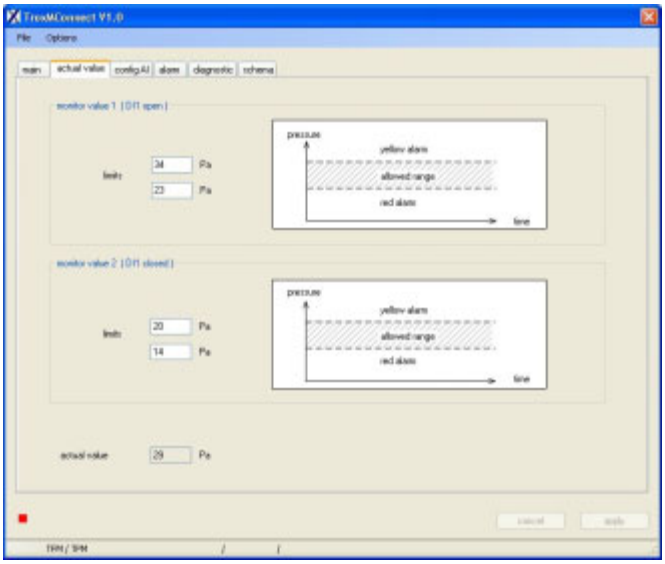
The following window appears when the button is pressed:



Please click "ok" after removing the pressure tubes. The current zero point of the internal pressure sensor is determined. This zeroing is to be repeated during annual maintenance to correct any zero point drift of the pressure sensor that may have occurred.
No further settings for measuring value recording are necessary, e.g. on the tab “config AI”, since the internal analogue input is configured in the program.

4.1.3 Monitor Value Recording

Before the monitor value can be recorded, you should check to see which monitor value is activated on the tab “diagnostic”. Switching between monitor values occurs via digital input DI 1. The volume flow in the ventilation system required for the fume cupboard must now be set. This may be checked by taking measurements manually, if necessary.
You can now read the pressure value at the measuring grid under actual value on the tab "actual value". This pressure serves as the initial value for setting the alarm limits.

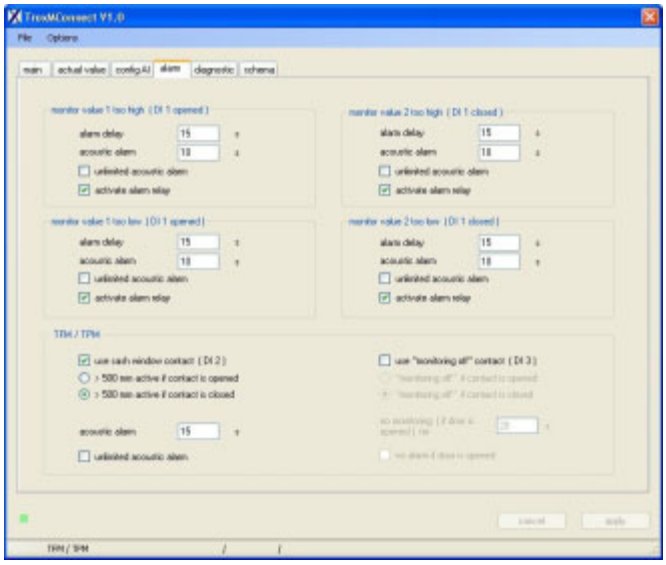


Now the monitoring limits must be set, depending on the measured pressure value. These limits should be approx. 10–20% above or below the measured pressure value. Value selection is incumbent on the judgement of the competent commissioning personnel.

If a second value is to be monitored, the procedure is to be repeated for this value in the same way.

4.1.4 Alarm Setting

Alarm handling can be set up individually on the tab "alarm" depending on the monitoring situation. For this purpose, refer to section 3.2.5 Tab "alarm" on page 9.



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4.2 Example Configuration of TFM-2 Connection to Volume flow Controller

With the TFM-2, the volume flow at the fume cupboard is monitored via the measurement at a volume flow controller. The actual volume flow signal of the volume flow controller is to be connected to the analogue input.

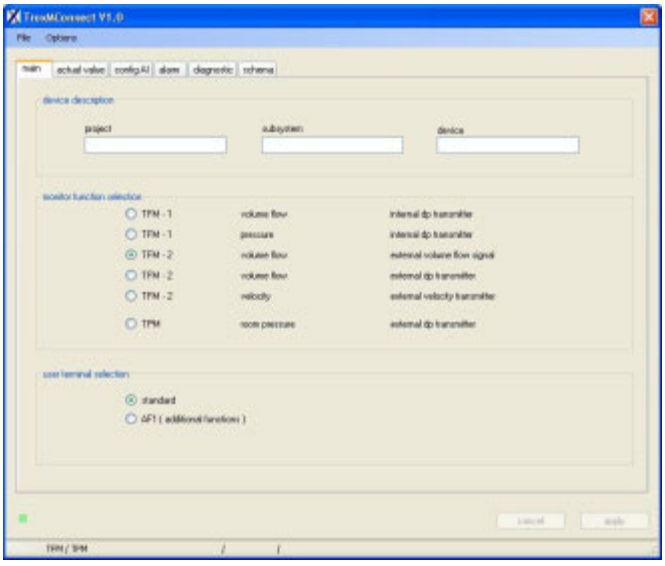
4.2.1 Function Selection

The indicator at the user terminal alternates between red and green (TFM/TPM not configured) the first time the TFM/TPM is started.

The following selection must be made on the tab main:

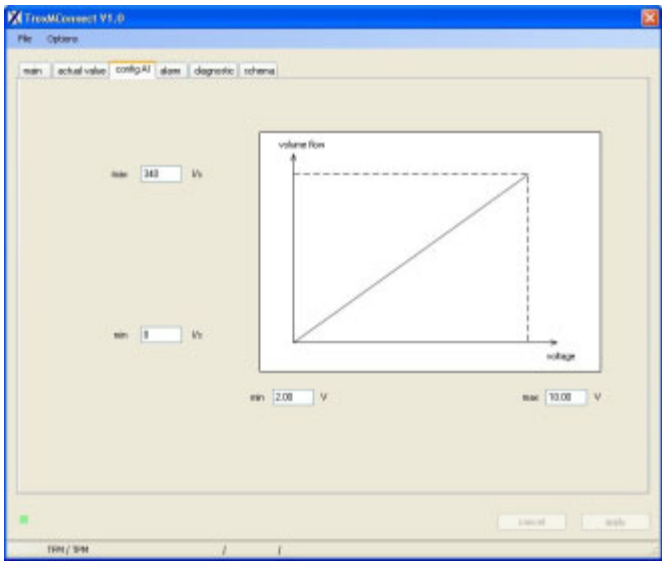
monitor function selection
- TFM-2, volume flow, external volume flow signal

user terminal selection
- Your choice; the example uses the standard user terminal.



4.2.2 Analogue Input Setting

The analogue input must be set to the actual volume flow signal of the connected controller. The voltage range and volume flow range of the connected controller are entered on the tab “config AI”.



Please refer to the documentation of the connected controller for the values to be set. Zeroing is not carried out, because an external, volume flow-linear measured value is recorded. The setting values of the most important controllers from TROX are listed in the following table.

Controller	Voltage range	Volume flow range actual value
TVLK/250-110/BB3 Belimo VRP/VFP	2–10 V	0–340 l/s
TVLK/250-140/BB3 Belimo VRP/VFP	2–10 V	0–280 l/s
TVLK/250-180/BB3 Belimo VRP/VFP	2–10 V	0–210 l/s
TVLK/250-0/BB3 Belimo VRP/VFP	2–10 V	0–615 l/s
TVRK/315/BB3 Belimo VRP/VFP	2–10 V	0–1025 l/s
TVRK/250/BB3 Belimo VRP/VFP	2–10 V	0–615 l/s
TVRK/200/BB3 Belimo VRP/VFP	2–10 V	0–405 l/s
TVRK/160/BB3 Belimo VRP/VFP	2–10 V	0–250 l/s

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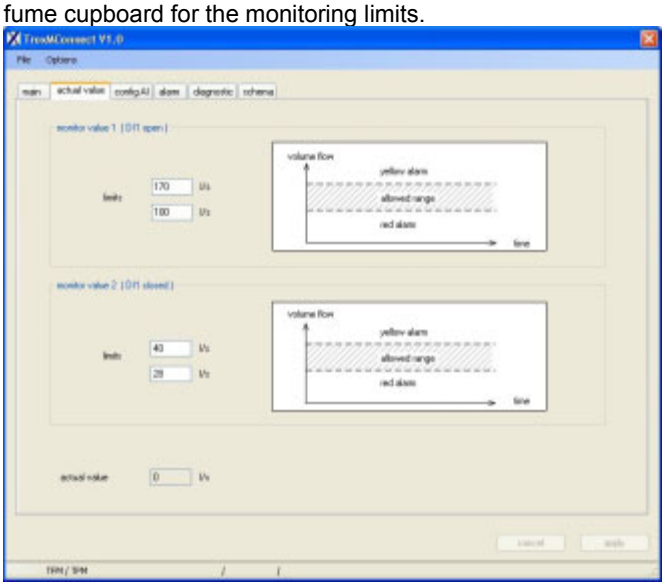
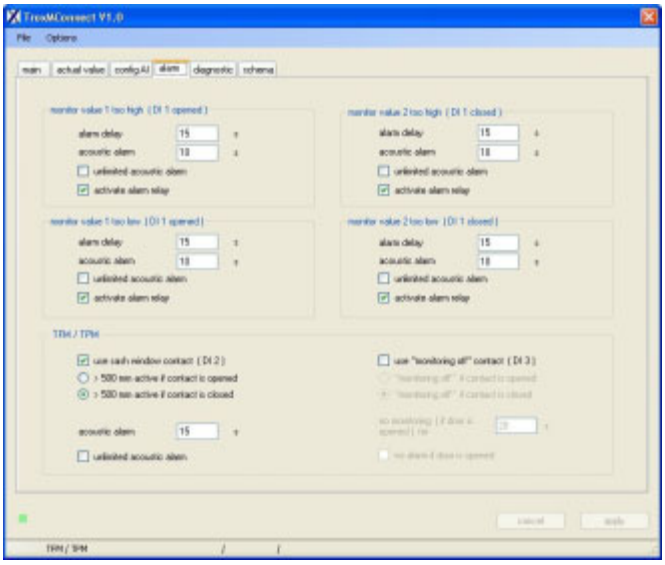
4.2.3 Monitor Value Setting

The volume flows to be monitored are entered on the tab "actual value". Please note that the monitoring limits must be entered here. Please refer to the documentation of the fume cupboard for the monitoring limits.



4.2.4 Alarm Setting

Alarm handling can be set up individually on the tab "alarm" depending on the monitoring situation. For this purpose, refer to section 3.2.5 Tab "alarm" on page 9.



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4.3 Example Configuration of TPM Room Pressure Monitoring

The pressure of a pressure-controlled room is monitored with a TPM. The actual pressure is switched by a room pressure sensor on the TPM. The actual pressure signal of the sensor is to be connected to the analogue input.

4.3.1 Function Selection

The indicator at the user terminal alternates between red and green (TFM/TPM not configured) the first time the TFM/TPM is started.

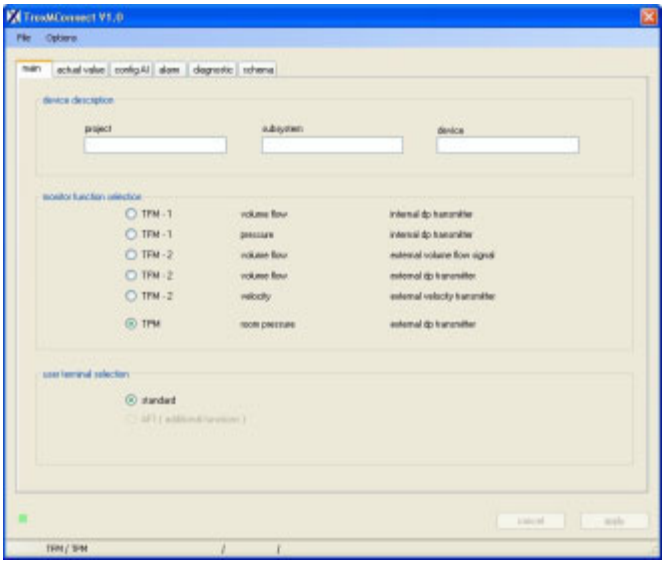
The following selection must be made on the tab “main”:

monitor function selection

- TPM, room pressure, external dp transmitter

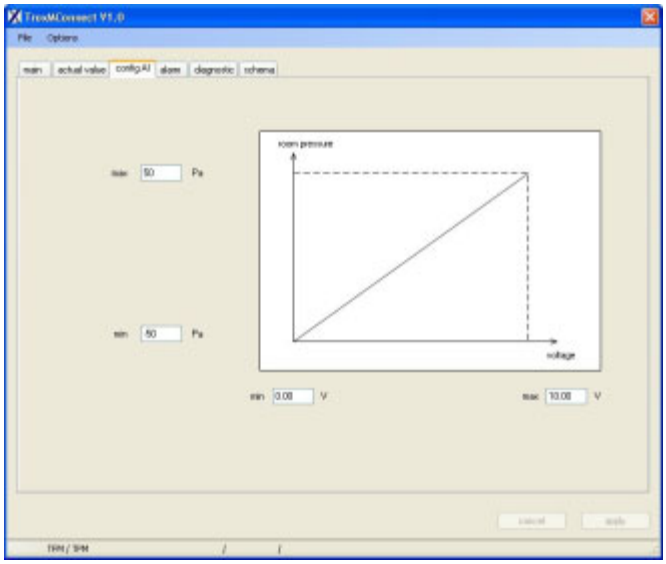
user terminal selection

- The TPM can only be operated with the standard user terminal. Only the standard user terminal can be selected.



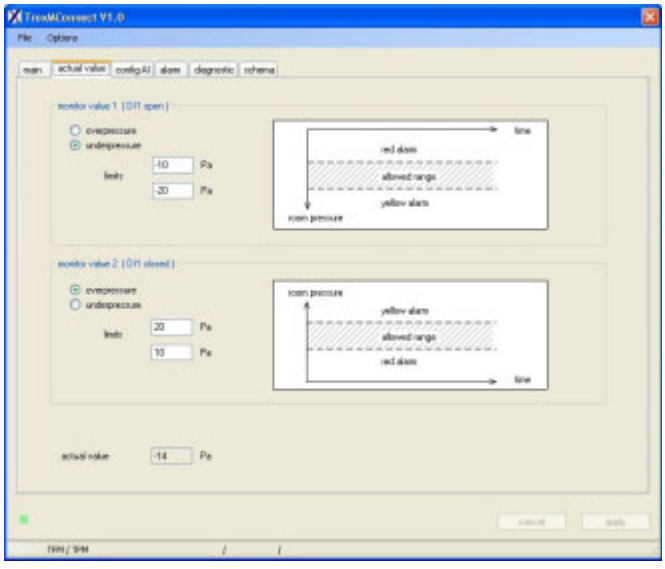
4.3.2 Analogue Input Setting

The analogue input must be set to the actual pressure signal of the connected pressure sensor. The voltage range and pressure range of the connected pressure sensor are entered on the tab “config AI”.



4.3.3 Monitor Value Setting

The pressures to be monitored are entered on the tab "actual value". Please note that the monitoring limits must be entered here. Please refer to the requirements of the system owner for the monitoring limits.



Since the way alarms are handled depends on whether a room is monitored with underpressure or with overpressure, this must be specified with the monitoring limits.

The diagrams shown here change accordingly depending on the values entered.

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4.3.4 Alarm Setting

Alarm handling can be set up individually on the tab "alarm" depending on the monitoring situation. For this purpose, refer to section 3.2.5 Tab "alarm" on page 9.

When dealing with alarms, the mathematical quantity is evaluated to decide whether the monitor value is too large or small.
Example: -40 Pa is less than -30 Pa.
This has to be made allowance for when making settings for alarm handling.